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AUTHOR Bryan, William R.; Linke, Charles M.
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ABSTRACT

Statistics prove that being middle-aged, well educated, white, and male enhances earnings. This paper uses data from the March 1991 Current Population Survey conducted by the Bureau of the Census along with some common statistical techniques to chart the specific impact of age, education, race, and gender on earnings. It is shown that earnings tend to begin low, rise well through middle age, then decline during the final years of an individual's work life. It also is shown that expanded earnings are associated with increases in education. With the first two variables examined--age and education--as with the others, charts and tables are included to convey the data described. The differences among races are markedly less if comparisons are made at comparable levels of education. Finally, lifetime earnings of males are higher than those of females among all races and at each level of educational attainment. (DB)

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William R. Bryan and
Charles M. Linke

The Earnings Impact of Age, Education, Race, and Gender

Being middle-aged, well-educated, white, and male enhances earnings. Although these findings are not surprising, the reader may be interested in the specific benefits that attach to each of these attributes.

Loosely speaking, each additional year of experience during an individual's third decade of life expands real earnings by 1–2 percent; during that same decade each additional year of education increases earnings by more than 10 percent; being white, rather than Hispanic or black adds about 15 percent to average earnings; and being male adds more than 30 percent. As suggested, these averages are rough approximates. Their meaning is clarified substantially if looked at in context.

The Data

Quite apart from its decennial census, the Bureau of the Census conducts a monthly population survey as part of its continuing effort to keep track of demographic developments. The March survey typically concentrates on earnings and income. In October 1991 the Bureau of the Census published results of its 1991 March survey (Money Income of Households, Families, and Persons in the United States: 1990, Bureau of the Census, US Department of Commerce, Series P-60, No. 174, 1991). Data from this survey, which reports earnings for the preceding year, differentiate between and among the earnings of males and females; whites, blacks and Hispanics; various levels of educational attainment, and various categories of age (Table 29, pp. 128–155 and Table 30, pp. 156–159).

In order to present the data in the formats used in the charts and tables of this article, interpolations were made based on common statistical techniques (see the box). These permit the data to be presented year-by-year fashion, rather than in unwieldy age intervals.

The Bureau of the Census does not report data in instances in which their sample base is less than 75,000. Consequently, for females generally and male Hispanics and blacks they are unable to report earnings data relating to all educational categories in each of their age groupings. These problems were more prominant among those born in the 1930s and 1940s than those born more recently. If it is possible to determine missing values, we do so. Otherwise, the estimates we show constitute interpolations beyond the range of the data we use for estimation. These data problems make us tentative in our interpretation of race and education statistics.

Life Cycle of Earnings

Earnings tend to begin low, rise well through middle age, then decline during the final years of an individual's work life. Presumably, this pattern of earnings is a reflection of the changes in an individual's productivity. In turn, the changes in productivity emerge from the gains associated with experience in the work force. Because the data presented here are cross-sectional — that is, they are observations taken at a single point in time, they do not reflect the changes in productivity that relate to changes in technology and, therefore, emerge with the passage of time. By virtue of that shortcoming, the data understate life cycle earnings.

For both men and women, the life cycle of earnings show increases

The general approach taken in preparing the estimates described herein is to view annual earnings as emerging from the following multiplicative process:

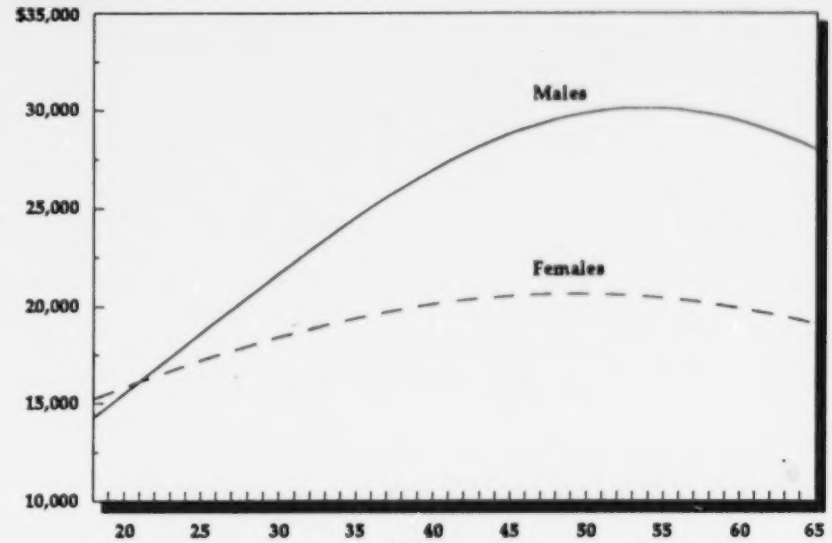
$$Y = (R) \times (G) \times (T) \times (LC)$$

where

R = race,
G = gender,
T = training, and
LC = life cycle.

In the work at hand, dummy variables (either 1 or 0) were used to stand in the place of white (W), black (B), or Hispanic (H); male (M) or female (F); and training was measured in terms of educational achievement. With respect to educational achievement, dummy variables were used to represent the following levels of education: eight years or less (E1), 1-3 years (E2), and four years of high school (E3), 1-3 years (E4), four years (E5), and five or more years of college (E6). Finally, the life cycle factors (LC) are estimated with an age variable (A) and, in order to take account of nonlinearity in the variable, age-squared (A^2). In addition, interaction terms were used between race and education.

Chart 1. Life Cycle of Earnings



through the middle years, then show declines beginning in the late fifties. But there are marked differences in earnings patterns between the sexes. Chart 1 presents the life cycle earnings patterns of men and women during an arbitrary work life beginning at age 18 and ending at age 65, neglecting factors relating to education and race. The earnings of women do not rise nearly as much as those of men during the period when earnings are rising. At their zenith, average earnings of men reach a point (at age 55) that is 120 percent above its rate at age 18. For women, their average earnings peak (at age 51) at a rate that is only 40 percent higher than its pace at age 18.

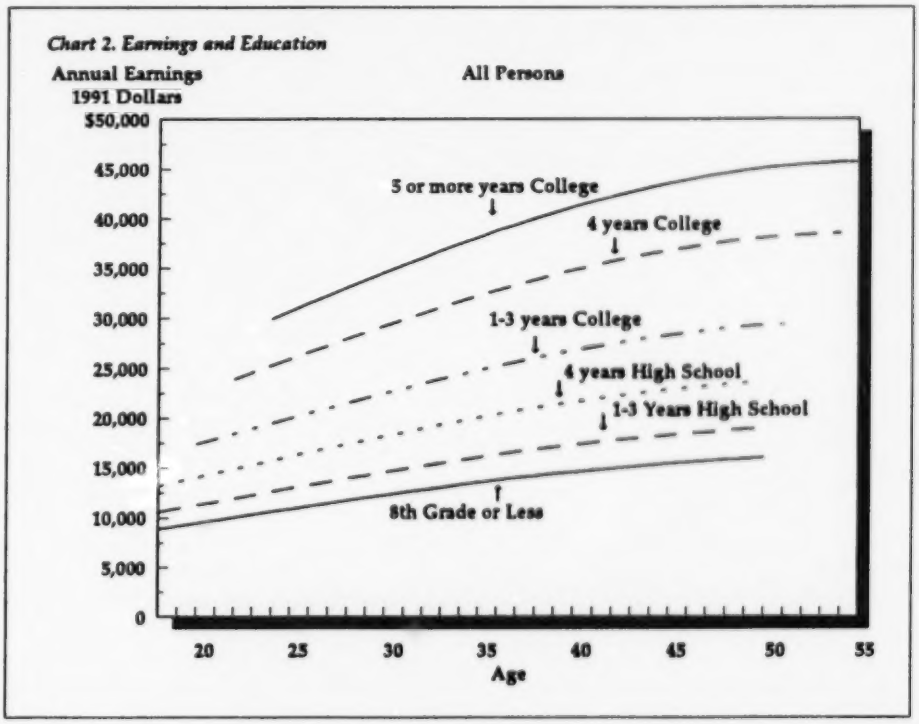
In part, but only in part, the observed differential reflects the fact that age is an imperfect measure of experience, especially as that measure relates to women. For a variety of reasons — some related to child-bearing and raising children — women are much more likely to enter, then leave, then re-enter the work force than are men. Hence, in comparing averages relating to men and women in Chart 1, there is an increased likelihood that, over substantial age ranges, men will possess greater average experience in the work force.

Education and Earnings

Clearly, expanded earnings are associated with increases in education. Even though entry into the work force is likely to be delayed for those who chose to continue their education, those earnings losses are more than made up by the higher annual earnings and a work life that extends into years at which experience is heavily valued.

Differences in earnings according to alternative levels of education are illustrated in Chart 2. For purposes of this chart, it is assumed that those with a high school education or less enter the work force at age 18; those with one to three years of college are depicted as entering the work force at age 20; those with four years of college are shown as

Chart 2. Earnings and Education



entering the work force at age 22; while those with five or more years of college are shown as entering the work force at age 24. In each case, it is assumed that the hypothetical earners are new entrants into the work force. The alternative worklife estimates are the average of data relating to men and women. The expected working life estimates the number of years a worker of a specific sex-age-education configuration is expected, on average, to continue his/her participation in the labor force. (For a discussion of the concept and for data see Worklife Estimates: Effects of Race and Education, US Department of Labor, Bureau of Labor Statistics, Bulletin 2254, February 1986.)

Suppose that a 16-year-old is considering the value of his or her high school education and is considering the value of additional education. It is reasonable to ask whether the higher earnings available to a high school graduate are sufficiently great to compensate for the fact that an individual must delay entrance into the work force. Even though earnings received later are inherently less valuable than earnings received now, there is a likelihood that money earnings will rise in the future. Moreover, there are out-of-pocket costs associated with attending college. Hence, it may be reasonable to draw comparisons between the costs of attending college and the anticipated future returns. The clear differences introduced by education are shown on Chart 2, and are summarized with regard to race and gender in Table 1.

Considering the summary statistics in Table 1, shown as weighted averages in the right-hand column, high school graduates have an average earnings capacity of $760,278 (stated in 1991 dollars), nearly 58 percent more than a person with one to three years of high school and almost 82 percent more than a worker with an eighth grade education or less. Similarly, a person with four years of college shows lifetime earnings of $1,273,835, nearly 70 percent greater than a high school graduate and more than 31 percent greater than a person with one to three years of college (Table 1). Finally, a person with five or more years of college shows lifetime earnings of $1,481,290 on average, 16.3 percent more than a college graduate and nearly twice the lifetime earnings of a high school graduate.

Part of the difference in lifetime earnings among those with different levels of education reflects the way this article has portrayed the concept of working lives. For ease of exposition, a person's worklife is depicted as though it begins at, say, 18 years of age for a male high school graduate, then extends continuously for the next 37.9 years. As a consequence of this approach, those who enter the labor force at an early age are shown as having their working life concentrated in the lower end of their potential life cycle of earnings. Conceptually, however, the 37.9 is not really a sum of years; it is a sum of probabilities. Each probability entering the sum is the probability that the 18-year old male high school graduate will be in the workforce at successive years in the future. That future runs to an age well into the late seventies (where it is truncated). Notwithstanding the expositional bias, we are confident that our interpretations of the data are not misleading.

*Table 1. Lifetime Earnings by Gender, Race and Education**

	in 1991 Dollars						
	Males			Females			
	White	Hispanic	Black	White	Hispanic	Black	Average*
8th grade or less	510,856 (34 yrs.)	449,712 (34 yrs.)	474,764 (34 yrs.)	226,762 (21.5 yrs.)	215,845 (21.5 yrs.)	206,887 (21.5 yrs.)	418,496
1-3 years high school	611,414 (33.4 yrs.)	575,965 (33.4 yrs.)	537,872 (33.4 yrs.)	282,742 (20.9 yrs.)	234,648 (20.9 yrs.)	241,179 (20.9 yrs.)	481,823
4 years high school	998,952 (37.9 yrs.)	810,259 (37.9 yrs.)	756,810 (37.9 yrs.)	479,234 (27.9 yrs.)	444,258 (27.9 yrs.)	433,210 (27.9 yrs.)	760,278
1-3 years college	1,228,183 (38.5 yrs.)	1,063,127 (38.5 yrs.)	1,022,247 (38.5 yrs.)	641,654 (30.3 yrs.)	642,549 (30.3 yrs.)	609,962 (30.3 yrs.)	971,174
4 years college	1,603,192 (37.1 yrs.)	1,380,846 (37.1 yrs.)	1,222,939 (37.1 yrs.)	774,070 (28.9 yrs.)	736,104 (28.9 yrs.)	811,090 (28.9 yrs.)	1,273,835
5 years college or more	1,795,990 (35.6 yrs.)	1,988,979 (35.6 yrs.)	1,392,919 (35.6 yrs.)	900,096 (27.3 yrs.)	791,142 (27.3 yrs.)	782,695 (27.3 yrs.)	1,481,290
Average*	1,208,434	827,208	851,410	591,143	465,334	517,668	

*Worklife estimates are in parentheses; averages are weighted by number of persons in each category.

Table 2. Distribution of Educational Attainment by Race and Gender

	Males			Females		
Educational Attainment	White	Hispanic	Black	White	Hispanic	Black
8th grade or less	4.75%	25.65%	6.81%	2.72%	17.69%	3.22%
1-3 years high school	6.98	13.50	12.00	5.92	11.46	10.74
4 years high school	36.64	32.35	44.41	41.68	36.86	42.12
1-3 years college	20.87	16.14	20.26	22.44	18.29	25.76
4 years college	17.29	7.49	11.06	16.42	9.53	11.97
5 years college or more	13.47	4.88	5.47	10.82	6.17	6.18

Race and Earnings

In terms of raw statistics, the average of 1990 earnings of white males was 46.1 percent higher than those of Hispanic males and nearly 42 percent higher than those of black males (for dollar magnitudes see bottom row of Table 1). In part, the differences in averages reflects the differences among the races in educational attainment and, hence, earnings. Among white males more than 50 percent have some college education, and just over 30 percent have four or more years of college education (Table 2). By comparison, among Hispanic males only 28.5 percent have some college education, and just over 12 percent have had four or more years of college (Table 2). Among black males 36.8 percent have some college education and nearly 16 percent have had four or more years of college.

The differences among races are markedly less, but substantial, if comparisons are made at comparable levels of education. It is noteworthy that some of the earnings differences narrow as education levels rise. Thus, for example, among high school graduates white males earn almost 23.3 percent more than Hispanic males and almost 32 percent more than black males. But among those with four years of college education white males earn 13.6 percent more than Hispanics; among those with five or more years of college Hispanic males show the greatest earnings. (The reader is reminded that data difficulties undermine our confidence in these estimates.)

Differences among females are somewhat less pronounced than those among males. Averages of median earnings of white females were 27 percent greater than earnings of Hispanic females and 14.2 percent greater than those of black females (see Table 1). Here again, however, a greater portion of white females had attained four or more years of college than among Hispanic or black females (Table 2).

At comparable levels of education the earnings differences among females were smaller than indicated by the overall average statistics. Among those with eight years of education or less, white females earned 5.1 percent more than Hispanic females and 9.6 percent more than black females. These differences were little changed among high school graduates, as white females earned nearly 8 percent more than Hispanic females and 6.2 percent more than black females. There was an interesting shift in positions among those females with four years of college; median earnings of white females averaged about 5.4 percent more than those of Hispanic females but nearly 4.6 percent less than for black females. Among females with five or more years of education the relative earnings of white females jumped sharply. White females earned nearly 14 percent more than Hispanic females and 15 percent more than black females. (Again, the reader is reminded that data difficulties, specifically small sample problems, indicate that these statistics are subject to pronounced sampling error.)

Earnings and Gender

Lifetime earnings of males are higher than those of females among all races and at each level of educational attainment (Table 3). Part of the difference in lifetime earnings reflects the fact that the worklife of males is substantially longer than the worklife of females with the same level of educational achievement. Even correcting for the differences in worklife, however, male earnings exceed female earnings by a substantial margin. The margin does not vary meaningfully among different races, nor is it ameliorated by educational achievement.

Table 3. Comparison of Average Annual Earnings of Females with Earnings of Males of Same Race and Education

Educational Attainment	White	Hispanic	Black
	(difference stated as a percent of male earnings)		
8th grade or less	-29.8	-24.1	-31.1
1-3 years high school	-26.1	-34.9	-28.3
4 years high school	-34.8	-25.5	-22.2
1-3 years college	-33.6	-23.2	-24.2
4 years college	-38.0	-31.6	-14.9
5 years college or more	-34.6	-48.1	-26.7